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<b>(21) International Application Number:</b> PCT/US92/03345 <b>(22) International Filing Date:</b> 24 April 1992 (24.04.92) <b>(30) Priority data:</b> 9109774.1 4 May 1991 (04.05.91) GB <b>(71) Applicant (for all designated States except US):</b> THE PROCTER & GAMBLE COMPANY [US/US]; One Procter & Gamble Plaza, Cincinnati, OH 45202 (US). <b>(72) Inventors; and</b> <b>(75) Inventors/Applicants (for US only):</b> COOKE, Richard, John [Stateless/ ]; 8 Venus Close, Wooschill, Wokingham, Berkshire RG11 2GG (GB). DATE, Robert, Francis [GB/GB]; 111 St. John's Road, Woking, Surrey GU21 1 QB (GB). BARRINGTON, Nigel, Geoffrey [GB/GB]; 21 Heathfield Road, Webbeath, Redditch, Worcestershire B97 5RB (GB). SPENGLER, Eric, George [GB/GB]; Hedgerows, 17 Walton Drive, Ascot, Berkshire SL5 7PG (GB).		<b>(74) Agent:</b> REED, T., David; The Procter & Gamble Company, Ivorydale Technical Center, 5299 Spring Grove Avenue, Cincinnati, OH 45217-1087 (US). <b>(81) Designated States:</b> AT (European patent), AU, BB, BE (European patent), BF (OAPI patent), BG, BJ (OAPI patent), BR, CA, CF (OAPI patent), CG (OAPI patent), CH (European patent), CI (OAPI patent), CM (OAPI patent), CS, DE (European patent), DK (European patent), ES (European patent), FI, FR (European patent), GA (OAPI patent), GB (European patent), GN (OAPI patent), GR (European patent), HU, IT (European patent), JP, KP, KR, LK, LU (European patent), MC (European patent), MG, ML (OAPI patent), MN, MR (OAPI patent), MW, NL (European patent), NO, PL, RO, RU, SD, SE (European patent), SN (OAPI patent), TD (OAPI patent), TG (OAPI patent), US. <b>Published</b> <i>With international search report.</i>	
<b>(54) Title:</b> SKIN AND HAIR-CARE GEL COMPOSITIONS  <b>(57) Abstract</b> <p>A skin or hair care composition in the form of an aqueous gel comprising glycerine, a water-soluble polyglycerylmethacrylate lubricant having a viscosity of less than 4000 cps, a hydrophilic gelling agent, and a fluid copolymer of ethylene oxide and propylene oxide. The compositions provide improved skin feel and skin care benefits, reduced tack and residue characteristics together with excellent visual clarity, moisturizing, rub-in and absorption characteristics.</p>			

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## SKIN AND HAIR-CARE GEL COMPOSITIONS

Technical Field

The present invention relates to skin- and hair-care cosmetic compositions. In particular it relates to cosmetic compositions in the form of aqueous gels which provide improved skin feel and skin care benefits, reduced tack and residue characteristics together with excellent visual clarity, moisturising, rub-in and absorption characteristics.

Background of the Invention

Skin is made up of several layers of cells which coat and protect the keratin and collagen fibrous proteins that form the skeleton of its structure. The outermost of these layers, referred to as the stratum corneum, is known to be composed of 250 Å protein bundles surrounded by 80 Å thick layers. Anionic surfactants and organic solvents typically penetrate the stratum corneum membrane and, by delipidization (i.e. removal of the lipids from the stratum corneum), destroy its integrity. This destruction of the skin surface topography leads to a rough feel and may eventually permit the surfactant or solvent to interact with the keratin, creating irritation.

It is now recognised that maintaining the proper water gradient across the stratum corneum is important to its functionality. Most of this water, which is sometimes considered to be the stratum corneum's plasticizer, comes from inside the body. If the humidity is too low, such as in a cold climate, insufficient water remains in the outer layers of the stratum corneum to properly plasticize the tissue; and the skin begins to scale and becomes itchy. Skin permeability is also decreased somewhat when there is inadequate water across the stratum corneum. On the other hand, too much water on the outside of the skin causes the stratum corneum to ultimately sorb three to five times its own weight of bound water. This swells and puckers the skin and results in approximately a two to three fold increase in the permeability of the skin to water and other polar molecules.

Hair consists of many of the same constituents as the stratum corneum. The outermost region of cells forms a rather thick chemically resistant

protective coating enclosing the hair fibre which is called the cuticle. The surface of the cuticle is covered with a thin layer called the epicuticle which is thought to contain lipids and protein. The cuticle envelopes the cortex cells which comprise the major part of the fibre mass. Keratinization takes place in the cortex to build stability into the hair structure.

Thus, a need exists for compositions which will assist the stratum corneum and hair cuticle in maintaining their barrier and water retention functions at optimum performance in spite of deleterious interactions which the skin and hair may encounter in washing, work, and recreation.

Conventional cosmetic cream and lotion compositions as described, for example, in Sagarin, *Cosmetics Science and Technology*, 2nd Edition, Vol.I, Wiley Interscience (1972) and *Encyclopaedia of Chemical Technology*, Third Edition, Volume 7 are known to provide varying degrees of emolliency, barrier and water-retention (moisturising) benefits. However, they can also suffer serious negatives in terms of skin feel (i.e. they often feel very greasy on the skin) as well as having poor rub-in, absorption and residue characteristics. In the case of hair-care compositions they can also suffer from resoiling negatives.

The present invention therefore provides skin- and hair-care cosmetic compositions which provide improvements in absorption, residue, tackiness, skin-feel and skin care characteristics without detriment to either short or longer term moisturizing effectiveness.

#### Summary of the Invention

Accordingly, in one aspect of the present invention, there is provided a skin or hair care composition in the form of an aqueous gel comprising:

- (a) from about 0.5% to about 20% by weight of glycerine,
- (b) from about 0.1% to about 10% by weight of a water polyglycerylmethacrylate lubricant having a viscosity (10% aqueous solution, 20°C, Brookfield RVT) of less than 4000 cps,
- (c) from about 0.1% to about 20% by weight of a hydrophilic gelling agent, and

- (d) from about 0.1% to about 5% by weight of a fluid copolymer of ethylene oxide and propylene oxide having a viscosity in the range of from about 55 to about 300,000 Saybolt Universal Seconds.

The compositions of this aspect of the present invention contain four essential ingredients as well as various optional components as indicated below. All levels and ratios are by weight of total composition, unless otherwise indicated.

A first essential ingredient is glycerine (sometimes known as glycerol or glycerin). Chemically, glycerine is 1,2,3- propanetriol and is a product of commerce. One large source of the material is in the manufacture of soap.

In the present compositions, glycerine is present at a level of from about 0.5% to about 20%, preferably from about 1% to about 10%, more preferably from about 2% to about 5% by weight of composition.

A second essential component is a water soluble polyglycerylmethacrylate lubricant. This generally should have a viscosity (10% aqueous solution, 20°C, Brookfield RVT) of less than about 4000 cps, preferably less than about 1000 cps and more preferably less than about 500 cps. In addition, the polyglycerylmethacrylate lubricant preferably also has a viscosity (neat) in the range of from about 200 to about 5000 cps (Brookfield RVT, 20°C), more preferably from about 500 to about 2000 cps and especially from about 700 to about 900 cps.

The polyglycerylmethacrylate lubricants which can be used in the compositions of this invention are available under the trademark Lubragel (RTM) from Guardian Chemical Corporation, 230 Marcus Blvd., Hauppauge, N.Y. 11787. In general, Lubragels can be described as hydrates or clathrates which are formed by the reaction of sodium glycerate with a methacrylic acid polymer. Thereafter, the hydrate or clathrate is stabilized with a small amount of propylene glycol, followed by controlled hydration of the resulting product. Lubragels are marketed in a number of grades of varying glycerate: polymer ratio and viscosity. Preferred for use herein, however, is so-called Lubragel Oil which has a

typical viscosity of about 800 cps. Other suitable Lubragels include Lubrigel TW, Lubragel CG and Lubragel MS.

In the present compositions, the polyglycerylmethacrylate lubricant is incorporated at a level of from about 0.1% to about 10%, preferably from about 0.2% to about 2%, and more preferably from about 0.3% to about 1% by weight of composition.

The compositions of the invention also contain a hydrophilic gelling agent at a level preferably from about 0.1% to about 20%, more preferably from about 0.2% to about 2%, and especially from about 0.3% to about 1%. The gelling agent preferably has a viscosity (1% aqueous solution, 20°C, Brookfield RVT) of at least about 4000 cps, more preferably at least about 10,000 cps, and especially at least 50,000.

Suitable hydrophilic gelling agents can generally be described as water-soluble or colloiddally water-soluble polymers, and include cellulose ethers (e.g. hydroxyethyl cellulose, methyl cellulose, hydroxy propylmethyl cellulose), polyvinylpyrrolidone, polyvinylalcohol, guar gum, hydroxypropyl guar gum and xanthan gum.

Preferred hydrophilic gelling agents herein, however, are acrylic acid/ethyl acrylate copolymers and the carboxyvinyl polymers sold by the B.F. Goodrich Company under the trade mark of Carbopol resins. These resins consist essentially of a colloiddally water-soluble polyalkenyl polyether crosslinked polymer of acrylic acid crosslinked with from 0.75% to 2.00% of a crosslinking agent such as for example polyallyl sucrose or polyallyl pentaerythritol. Examples include Carbopol 934, Carbopol 940, Carbopol 950 and Carbopol 980. Carbopol 934 is a water-soluble polymer of acrylic acid crosslinked with about 1% of a polyallyl ether of sucrose having an average of about 5.8 allyl groups for each sucrose molecule. A most preferred polymer is Carbopol 980 which has an average molecular weight of about 4,000,000. Also preferred for use herein are hydrophobically-modified cross-linked polymers of acrylic acid having amphipathic properties available under the Trade Name Carbopol 1342 and Pemulen TR-1 (CTFA Designation: Acrylates/10-30 Alkyl Acrylate Crosspolymer.) Highly preferred from the viewpoint of tack

reduction is a combination of the polyalkenyl polyether cross-linked acrylic acid polymer and the hydrophobically modified cross-linked acrylic acid polymer.

Neutralizing agents suitable for use in neutralizing acidic group containing hydrophilic gelling agents herein include sodium hydroxide, potassium hydroxide, ammonium hydroxide, monoethanolamine, diethanolamine and triethanolamine.

In preferred embodiments, the compositions of the invention also contain from about 0.1% to about 10%, preferably from about 1% to about 5% of a panthenol moisturiser. The panthenol moisturiser can be selected from D-panthenol ([R]-2,4-dihydroxy-N-[3-hydroxypropyl]-3,3-dimethylbutamide), DL-panthenol, calcium pantothenate, royal jelly, panthetine, pantotheine, panthenyl ethyl ether, pangamic acid, pyridoxin, pantoyl lactose and Vitamin B complex. Highly preferred from the viewpoint of skin care and tack reduction is D-panthenol.

The compositions of the invention are in aqueous gel form and are preferably formulated so as to have a product viscosity of at least about 4,000 and preferably in the range from about 4,000 to about 300,000 cps, more preferably from about 20,000 to about 200,000 cps and especially from about 80,000 to about 150,000 cps (20°C, neat, Brookfield RVT). Preferably the compositions are visually clear. The compositions are also preferably substantially free of oil, i.e. contain less than about 1%, and preferably less than about 0.1% of materials which are insoluble or which are not colloiddally-soluble in the aqueous gel matrix at 20°C. "Colloiddally-soluble" herein refers to particles in the usual colloiddal size range, typically from 1 to 1000 nm, especially from 1 to 500 nm. In highly preferred embodiments, the compositions are substantially free of materials which are insoluble or not colloiddally soluble in distilled water at 20°C. Such materials include many conventional emollient materials such as hydrocarbon oils and waxes, glyceride esters, alkyl esters, alkenyl esters, fatty alcohols, certain fatty alcohol ethers and fatty acid esters of ethoxylated fatty alcohols, sterols extracted from lanolin, lanolin esters, wax esters, beeswax derivatives, vegetable waxes, phospholipids, sterols and amides.

The compositions can, however, contain low levels of insoluble ingredients added, for example for visual-effect purposes, e.g. thermochromic liquid crystalline materials such as the microencapsulated cholesteryl esters and chiral nematic (non-sterol) based chemicals such as the (2-methylbutyl)phenyl 4-alkyl(oxy)benzoates available from Hallcrest, Glenview, Illinois 60025, U.S.A.

The compositions of the invention have no need of and are preferably also substantially free of surfactant materials which are conventionally added to cosmetic cream and lotion compositions in order to emulsify a water-insoluble oily phase. Again, "substantially free" means less than about 1%, preferably less than about 0.1% of the indicated materials. Such emulsifiers include ethoxylated fatty acids, ethoxylated esters, phosphated esters, ethoxylated fatty alcohols, polyoxyethylene fatty ether phosphates, fatty acid amides, acyl lactylates, soaps, etc.

A further essential component of the compositions herein added for the purpose of skin feel and tack reduction is a fluid copolymer of ethylene oxide and propylene oxide having a viscosity in the range of from about 55 to about 300,000 Saybolt Universal Seconds (S.U.S.), preferably from about 100 to about 2,000 S.U.S. at 100°F, for example Ucon Fluid 75-H 450.

The combination of polyglycerylmethacrylate lubricant and the fluid copolymer has been found to be generally valuable herein for reducing the tack of aqueous gel-form skin or hair care compositions. According to another aspect of the invention, therefore, there is provided a skin or hair care composition in the form of an aqueous gel comprising:

- (a) from about 0.5% to about 30% by weight of a polyhydric alcohol humectant,
- (b) from about 0.1% to about 10% by weight of a water-soluble polyglycerylmethacrylate lubricant having a viscosity (10% aqueous solution, 20°C, Brookfield RVT) of less than 4000 cps,
- (c) from about 0.1% to about 20% by weight of a hydrophilic gelling agent; and
- (d) from about 0.1% to about 5% by weight of a fluid copolymer of ethylene oxide and propylene oxide having a



viscosity in the range of from about 55 to about 300,000 Saybolt Universal Seconds.

Polyhydric alcohol humectants other than glycerol which can be added herein include sorbitol, propylene glycol, butylene glycol, hexylene glycol, ethoxylated glucose and hexanetriol.

A number of additional water-soluble materials can be added to the compositions of the invention. An optional but preferred ingredient of the compositions of the invention is trimethylglycine, otherwise sometimes known as betaine. Trimethylglycine is valuable herein from the viewpoint of providing improved skin feel and tack reduction. In the present compositions, trimethylglycine is preferably present at a level of from about 1% to about 10% by weight, preferably from about 3% to about 7% by weight.

Other optional ingredients include keratolytic agents such as salicylic acid; proteins and polypeptides and derivatives thereof; water-soluble or solubilizable preservatives such as Germall 115, methyl, ethyl, propyl and butyl esters of hydroxybenzoic acid, EDTA, Euxyl(RTM)K400, Br̄mopol (2-bromo-2-nitropropane-1,3-diol) and phenoxypropanol; anti-bacterials such as Irgasan (RTM) and phenoxyethanol (preferably at levels of from 0.5% to about 5%); soluble or colloiddally-soluble moisturising agents such as hylaronic acid, and starch-grafted sodium polyacrylates such as Sanwet (RTM) IM-1000, IM-1500 and IM-2500 available from Celanese Superabsorbent Materials, Portsmouth, VA, USA and described in USA-A-4,076,663; colouring agents; perfumes and perfume solubilizers etc. Water is also present at a level of from about 50% to about 99.2%, preferably from about 80% to about 95% by weight of the compositions herein.

The pH of the compositions is preferably from about 4 to about 9, more preferably from about 4.5 to about 7.

The invention is illustrated to the following limiting examples.

Examples I to V

	I	II	III	IV	V
D-Panthenol	2	4	4	1	3
Glycerine	4	2	6	5	3
Ucon 75-H 450	1	1	1	1	1
Lubragel Oil	0.5	0.5	2.0	0.5	0.5
Lubragel TW	-	1.0	-	5.0	-
Carbopol 980	0.5	0.4	0.6	0.4	0.4
Pemulen TR-1	0.2	0.4	0.4	0.3	0.3
Sodium hydroxide	0.25	0.25	0.3	0.2	0.2
Methyl parabens	0.2	0.3	0.2	0.3	0.1
Germall 115	0.2	-	0.2	-	0.2
Hexylene glycol	2	-	-	-	2
Phenoxyethanol	-	-	-	2.5	-
Trimethylglycine	5	4	3	4	6
Deionised Water	-----To 100-----				

The compositions are made by mixing at ambient temperature.

The compositions display improved skin feel, skin care, tackiness and residue characteristics together with excellent moisturizing, emolliency, rub-in and absorption characteristics.

## CLAIMS

1. A skin or hair care composition in the form of an aqueous gel comprising:
  - (a) from about 0.5% to about 20% by weight of glycerine,
  - (b) from about 0.1% to about 10% by weight of a water-soluble polyglycerylmethacrylate lubricant having a viscosity (10% aqueous solution, 20°C, Brookfield RVT) of less than 4000 cps,
  - (c) from about 0.1% to about 20% by weight of a hydrophilic gelling agent; and
  - (d) from about 0.1% to about 5% by weight of a fluid copolymer of ethylene oxide and propylene oxide having a viscosity in the range of from about 55 to about 300,000 Saybolt Universal Seconds.
2. A composition according to claim 1 comprising from about 1% to about 10%, preferably from about 2% to about 6% by weight of glycerine.
3. A composition according to claim 1 or 2 wherein the polyglycerylmethacrylate lubricant is a hydrate or clathrate formed by the reaction of sodium glycerate with a methacrylic acid polymer.
4. A composition according to any of claims 1 to 3 wherein the polyglycerylmethacrylate lubricant has a viscosity (neat) in the range of from about 200 to about 5000 cps (Brookfield RVT, 20°C), preferably from about 500 to about 2000 cps, more preferably from about 700 to about 900 cps.
5. A composition according to any of claims 1 to 4 comprising from about 0.2% to about 2%, preferably from about 0.3% to about 1% by weight of the polyglycerylmethacrylate lubricant.

6. A composition according to any of claims 1 to 5 having a viscosity (20°C, neat, Brookfield RVT) of from about 4000 to about 300,000 cps.
7. A composition according to any of claims 1 to 6 wherein the gelling agent has a viscosity (1% aqueous solution, 20°C, Brookfield RVT) of at least about 4000 cps, preferably at least about 10,000 cps.
8. A composition according to any of claims 1 to 7 wherein the gelling agent comprises a carboxyvinyl polymer, preferably a colloiddally water-soluble polymer of acrylic acid cross-linked with from about 0.75% to about 2.0% of a cross-linking agent selected from polyallyl sucrose and polyallyl pentaerythritol.
9. A composition according to any of claims 1 to 8 wherein the gelling agent comprises a hydrophobically-modified cross-linked polymer of acrylic acid having amphipathic properties.
10. A composition according to any of claims 1 to 9 comprising from about 0.2% to about 2%, preferably from about 0.3% to about 1% of the gelling agent.
11. A composition according to any of claims 1 to 10 comprising from about 0.1% to about 10% of a panthenol moisturiser.
12. A composition according to any of claims 1 to 11 which is substantially oil-free.
13. A composition according to any of claims 1 to 12 additionally comprising from about 1% to about 10% of trimethylglycine (betaine).
14. A skin or hair care composition in the form of an aqueous gel comprising:
  - (a) from about 0.5% to about 30% by weight of a polyhydric alcohol humectant,
  - (b) from about 0.1% to about 10% by weight of a

water-soluble polyglycerylmethacrylate lubricant having a viscosity (10% aqueous solution, 20°C, Brookfield RVT) of less than 4000 cps,

- (c) from about 0.1% to about 20% by weight of a hydrophilic gelling agent; and
- (d) from about 0.1% to about 5% by weight of a fluid copolymer of ethylene oxide and propylene oxide having a viscosity in the range of from about 55 to about 300,000 Saybolt Universal Seconds.

# INTERNATIONAL SEARCH REPORT

International Application No. PCT/US92/03345

**I. CLASSIFICATION OF SUBJECT MATTER** 1. International Classification (IPC) or to both National Classification and IPC

IPC(5) CL: A61K 7/06, 7/48  
U.S. CL: 424/70; 514/844, 944

**ii. FIELDS SEARCHED** Minimum Documentation Searched

Classification System: U.S. 424/70  
514/844, 944

Classification Symbols

Documentation Searched other than Minimum Documentation  
to the Extent that such Documents are Included in the Fields Searched \*

**STN COVERING CHEMICAL ABSTRACTS 1907-1992: polyglycerylmethacrylate/cthyline  
or propylene oxide/glycerine/humectant/gel**

III. DOCUMENTS CONSIDERED TO BE RELEVANT *		
Category *	Citation of Document, ** with indication, where appropriate, of the relevant passages **	Relevant to Claim No. **
X	U.S., A 4,863,725 (DECKNER) 05 SEPTEMBER 1989 (SEE ENTIRE DOCUMENT)	1-14
X	U.S., A 4,837,019 (GEORGALAS ET AL) 06 JUNE 1989 (SEE ENTIRE DOCUMENT)	1-14
Y	U.S., A 4,781,923 (PELLICO) 01 NOVEMBER 1988 (SEE ENTIRE DOCUMENT)	1-14
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## IV. CERTIFICATION

Date of the Actual Completion of the International Search

Date of Mailing of this International Search Report

06 JULY 1992

21 JUL 1992

International Searching Authority

Signature of Authorized Officer *Phyllis Spivack*

PHYLLIS SPIVACK INTERNATIONAL DIVISION

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